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SHIPBUILDING HERE AND ABROAD.

BY NAVAL-CONSTRUCTOR PHILIP HICHBORN, U. S. N.

THE federal and State laws of the United States have hitherto been singularly adverse to shipping interests, and while every other industry has received encouragement and support through a protective tariff that of shipbuilding has been left to take care of itself. A free-trade advocate, discussing the merits of the Cockran Bill "to encourage American shipping," declares that "there is very little sentiment in the steamship business," which might be further extended to include all sorts of business. Fortunately for American industries sentiment, which in this application stands for national pride, has made them self-supporting and has conferred benefits on all classes alike. Without this sentiment we should still be dependent upon the factories of the old world; and, as the genuine free-trader clamors for, be content to raise breadstuffs to barter for articles manufactured abroad.

American bottoms declined from 66.04 in 1860 to 20.61 per cent. in 1892; and exports in American bottoms were lowered from 66.5 to 12.3 per cent. Because of this lack of sentiment, the only four steamers flying the American flag in the Atlantic fleet were obliged to succumb, in 1884, to the hundreds of competing foreigners; and our Government paid in 1889 only about $110,000 for the transportation of mails in American vessels, while foreign steamship lines received over $510,000.

The bills recently passed by Congress allowing subsidies to American steamers that shall come up to certain requirements is a move in the right direction. It is admitted that the first cost of a ship here is greater than in Scotland and that the expense of running sailing and steam vessels is greater under the American flag than under any other flag; but in the first cost of the vessel the difference is actually not so great as to make ship-owning unprofitable, as our vessels compare favorably in every respect with similar ones built abroad for like purposes, and will last as long. Opponents at home argue that the first cost and running expenses of American vessels prevent their profitable employment, and our adversaries abroad, such as shipbuilders and underwriters, contend that American ships are lowest in the scale of duration and they therefore discriminate against American bottoms. It is evident that these charges of inferiority are baseless, for it is universally admitted that our iron and steel material is far superior to that used in Europe, and that the design and workmanship should be inferior to foreign work none but supporters of Lloyd's methods would have the hardihood to pretend.

It is only about seven years ago that the English press bubbled over with anticipated joy over the undoubted failures that would follow our attempt to build a new navy. On July 10, 1885, one paper (*The Engineer*) commented upon the proposition of Secretary Whitney to build a number of ships, and sneeringly concluded: "The question is, who is to build them?" Again on January 29, 1886, this same paper referring to the "Chicago," said: "If the boat is a success then it is clear that British engineers do not know their business." These adverse comments might be multiplied to an interminable extent, but the hopes of our enemies abroad were not realized; a dozen firms have built a fleet of men-of-war unsurpassed by any, and the "Chicago" has proved a success.

The following tables show the relative cost of ships in foreign navies and in the American navy, but it should be borne in mind that there are no two ships identical in every respect produced in the different navies, and that displacement and cost afford no fair basis of comparison. The speed, armament and protection vary with the ships.

The accompanying tables exhibit some remarkable facts. A fair idea of comparative cost can be obtained only from exactly similar ships built under like conditions and at the same time in the respective countries. It is quite evident that the "Charleston" and "Yorktown" did not realize any profit to the builders, and later-built ships may be taken as a nearer correct basis for comparisons. With the disadvantage of paying nearly twice as much for labor and one-third more for material, our shipbuilders have done remarkably well in producing ships

COMPARATIVE COST OF UNITED STATES AND FOREIGN NAVAL VESSELS. HULL AND MACHINERY.

United States Navy.

Name.	Class.	Built.	Tons.	Horse Power.	Speed.	Contract Cost.	Cost per Ton.
Chicago	Cr.	1883	4,500	5,084	15.33	$889,000	$197
Boston	Cr.	1883	3,189	4,030	15.60	619,000	194
Dolphin	D. V.	1883	1,485	2,240	15.5	315,000	212
Newark	Cr.	1887	4,083	8.869	19.	1,248,000	305
Charleston	Cr.	1887	4,010	6,666	18.2	1,017,000	251
Baltimore	Cr.	1887	4.600	10,064	19.58	1,325,000	284
Philadelphia	Cr.	1888	4,324	8,815	19 68	1,325,000	306
Yorktown.	G. B.	1887	1,700	3,660	16.65	455,000	262
Petrel	G. B.	1887	890	1,513	11.55	247,000	277
Montgomery	Cr.	1890	2,000	5,400	17.	612.500	306
Machias	G. B.	1890	1,050	1,600	14.	318,000	303
Cincinnati*	Cr.	1890	3,183	10,000	19.	†1,100,000	345
Olympia	Cr.	1890	5,500	13,500	20.	‡1,796,000	326
Columbia	Cr.	1890	7,350	21,000	21.	‡2,725,000	370

* Building in navy-yard,
† Complete except armament.
‡ Complete except armament and equipment.

Foreign Navies.

Nationality.	Name.	Class.	Built.	Tons.	Horse Power.	Speed.	Contract Cost.	Cost per Ton.
British.	Leander	Cr.	1880	4,300	5,500	17.	$793,335	$184
British.	Terpsichore	Cr.	1888	3,400	9,000	20.	781,610	229
British	Surprise	D. V.	1883	1,650	3,030	17.	346,820	210
French.	Alger*	Cr.	1887	4,160	8,000	19.2	1,272,515	278
French.	Davoust*	Cr.	1887	3,027	9,000	20.	965,200	318
Spanish	Reine Regenta.	Cr.	1888	4,800	11,000	20.7	1,100,000	228
Germ	Princess Wilhelm.	Cr.	1885	4,300	8,000	18.	1,125,000	261
British.	Archer	T. Cr.	1885	1,770	3,500	17.	336,905	190
British.	Bellona	Cr.	1888	1,830	6,000	19.5	390,025	213
French.	Lalande	Cr.	1886	1,877	6,000	20.5	591,875	310
Germ..	Wacht.	D. V.	1887	1,240	4,000	20.	357,000	286
British.	Mercury*	Cr.	1876	3,730	7,290	18.	1,128,255	302
French.	Cecille	Cr.	1885	5,766	9,600	19.	1,498,010	259
French.	Le Tage	Cr.	1885	7,045	10,330	19	1,767,005	250
British.	Endymion.	Cr.	1888	7,350	12,000	19.75	1,508,540	205
British.	Blenheim	Cr.	1888	9,000	17,000	21.	1,829,910	209
British.	Blake*	Cr.	1888	9,000	17,009	21.	1,672,930	185
British.	Edgar*	Cr.	1888	7,350	12,000	19.75	1,616,120	220

* Built in dock yards and not including establishment charges in British Dock Yard.

at an advanced cost of only about 33 per cent. over British ships. That German and French ships make such an extraordinary showing in cost, notwithstanding the beggarly wages paid in those countries, strongly intimates that cheap labor is not so profitable in the end.

M. Dislere, writing in 1878 about British and French shipbuilding, said that the average wages paid in British dockyards were 6 fr. 7 c. ($1.34) per day, against 2 fr. 58 c. (51.6 cents) in French dockyards, yet the cost of work was about the same in the two countries. Captain Gambier, R. N., in *The Engineer* of March, 1887, describing shipbuilding and engine work in Italy, shows that it costs nine cents per pound for labor, and yet wages are much lower in Italy than in England. In December, 1890, the London *Times* claimed the relative cost per ton weight of hull to be: In England, £30 5s.; in France, £46 9s.; and in Russia, £87 5s. It gave also the cost of engines per horse power at £30 4s. in England, and in the United States at £56.

Coming down to a later date, the average wages in French dockyards in 1892 were 69 cents per day, and in British dockyards $1.21. For the corresponding time, the average wages paid in the navy yards of the United States may be assumed to be $2.40, and the wages thus stand in the following order:

United States, $2.40 = 2 × England and 3½ × France.
England, 1.21 = ½ of U. S. and 1¾ × France.
France, .69 = 28¾ per cent. of U. S. and 57 per cent. of England.

Now, as to material, the cost of steel for the ships built for the United States Navy during 1887 and 1888 was not less than 4 cents per pound against 2½ cents paid in England during the same period. Assuming that this same difference in cost extended to all other kinds of material used in ship and engine construction, the account stands 60 per cent. to the disadvantage of this country. Taking a ship like the "Charleston," as an example for comparison, with a similar British ship, the proportionate expenditures are 69 per cent. for labor and 31 per cent. for material of the sum total, which would make the cost of the American-built ship 72.6 per cent. greater than the British-built. The table of comparative cost of ships does not, however, give any such results, and, besides, it is conceded that every vessel built for our navy from a foreign ship is a great improvement on its prototype; that the material used is superior to that used in England; and that our ships are fitted up in a manner such as to make them luxurious in comparison with foreign ships. "The little extravagancies on our part," as Mr. Charles Cramp expressed it in a recent article in THE NORTH AMERICAN REVIEW —explaining the apparent greater cost of United States naval vessels—are quite properly and justly incurred, for life on board a ship is not comfortable at best, and there is no good reason why the ship's officers and crew should be made still more uncomfortable through stinginess on the part of the Government.

The foregoing tables prove conclusively that this country, unskilled as it was claimed to be in building ships of war, has been able not only to copy successfully but also to improve greatly upon the war vessels built abroad. Six years ago neither shafts, gun forgings nor armor could be produced in this country, and we were dependent upon England and Germany. At the present time we have reached not only the height of foreign achievements in ships, gun and armor, but have improved upon them; and if navy-building be permitted to go on, establishments will multiply and improve so as to make it not only possible but quite probable that the United States will become the factory of war material for such countries as now go to England, France and Germany.

As naval shipbuilding is the highest grade of ship construction, it follows that when occasion demands we shall be able to turn out duplicates of and improvements upon such ships as the "City of New York,"* "Fürst Bismarck," "Touraine" and "Teutonic." The building of large ocean steamers presents less difficulties than that of ships-of-war of moderate size. In the large ocean steamer everything is sacrificed for speed, and length, width and depth are allotted without stint. In a ship of 500 to 600 or more feet it is upon the marine engineer mainly that everything depends, and it would be passing strange if our talent in that line could not reproduce and improve upon the splendid engines in our new navy where the designer was cramped for room.

Until the American flag was hoisted on the "City of New York,"* on February 22, there were no fast transatlantic steamers flying the stars and stripes. We have had, however, home-built steamships plying on the Pacific, south Atlantic and to the West Indies, not to omit the coasting and lake steamers, that are as fast, as commodious, and as safe as similar vessels (if such exist) abroad. The old "City of Peking," built in 1874, is a better and more profitable steamer than the "China," built in Glasgow in 1889, and placed on the same route as the "City of Peking." The following comparative data may be of interest

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* Now the "New York."

Data.	City of Peking.	China.
Built	1874	1889
Gross tons	5,079	5,480
Cargo capacity	4,000	3,600
Length over all, feet	423	466
Maximum speed	15	17
Coal, tons per day, at 11 knots	47	61
" " " " 12 "	56	68
" " " " 13 "	68	81
" " " " 14 "		100
" " " " 15 "		125

It will be noted that the coal consumption, so important a factor in successful steamship running, is decidedly in favor of the "City of Peking."

Taking a few instances of well-known American-built steamers, we find the "Louisiana," of 2,840 tons, consuming only 34 tons, at a speed of 14¾ knots; the "Mariposa," 3,158 tons, burning 50 tons to make 14½ knots, and the "San Pablo," 3,119 tons, requiring only 35 tons at 13 knots, and 40 tons to make 14 knots. Then there is the "Australia," 2,730 tons, a British steamer, chartered for the San Francisco and Melbourne route, originally fitted with compound engines, and with a consumption of 53 tons of coal making only 12 knots. In 1889 her engines and boilers were removed, and new triple expansion engines and boilers carrying 160 pounds were built in San Francisco and put in the ship. With this new machinery she is now making 14 knots on an expenditure of only 37 tons. From these examples it would appear as if American marine engine-builders have a considerable share of the knowledge of which Scotch builders claim a monopoly; while the performance of the old "City of Peking" would indicate that our marine engineers know more of the economics of steamship performance than the Clyde builders.

It is stated that no less than four steamers, duplicates of and possibly improvements upon the "City of Paris," are to be built at Cramp's Yard. The question of ability to build ships in this country is no longer to be mentioned in discussing the subject. It is simply a question of dollars and sentiment, and there seem to be men willing to make a practical demonstration of their patriotism and take the chances of American transatlantic travellers patronizing an American steamship line. To reproduce a new "City of Paris" in a shipyard on this side will require an advanced cost of about 20 per cent. upon

$1,600,000, the reported cost of that steamer, which was built in Scotland.

In the following table the reported cost of some well-known transatlantic steamers is given together with such data as will facilitate computation of cost of similar ships built in this country :

COST OF TRANS-ATLANTIC AND OTHER STEAMERS BUILT IN GREAT BRITAIN AND GERMANY.

Name.	Built.	Iron or steel.	Gross tons.	Horse power.	Speed.	Total cost dollars.	Cost per gross ton.	Builders.
Britannic..........	1874	I	5,004	5,400	16.08	925,000	$185	Belfast.
Arizona..........	1879	I	5,164	6,357	17.	825,000	160	Glasgow.
Orient	"	I	5,365	5,595	14.	750,000	140	"
Alaska............	1881	I	6,932	10,000	17.87	1,200,000	173	"
Servia............	"	S	7,392	10,350	16.75	1,327,000	179	"
Oregon............	1883	S	7,375	13,300	18.75	1,680,000	228	"
Aurania...........	"	S	7,269	8,500	16.85	1,380,000	190	Clydebank
America	1884	S	5,528	7,354	18.71	975.000	176	"
Etruria	"	S	8,120	14,321	18.80	1,695,000	209	"
City of Paris......	1888	S	10,499	21,000	20.76	1,600,000	152	"
Augusta Victoria.	1889	S	7,641	14,110	18.31	*878,715	*115	Stettin.
Teutonic..........	"	S	9.686	18,000	20.18	1,954,000	203	Belfast.
Fürst Bismarck..	1890	S	8,716	16,000	19.86	*1,002,000	*115	Stettin.
Normannia........	"	S	8,250	15,000	19.20	*948,750	*115	Glasgow.

Steamers with a * indicate cost of hull and machinery only. All others are complete with fittings ready for sea.

The cost of mild steel for shipbuilding purposes has been greatly reduced in this country during the past few years. From 6 cents per pound in 1885 it has fallen to 2 cents at the present time, while in Scotland the cost has also decreased in the same period from 2½ cents to 1⅓ cents. Thus the American shipbuilder has to pay 50 per cent. more for his steel than his competitor on the Clyde. The American workmen receive in Cramp's Yard about 80 per cent. higher wages than were paid to the workmen that built the "City of Paris."

It may therefore be accepted as a fact that in high-class work the shipbuilder in this country requires 20 per cent. more pay, but when it comes to what may be termed second and third class steamers, the Americans are "not in it" at all, and for very good reasons. Competition has greatly reduced the price of steamers in Scotland and the requirements of trade have demanded, or rather made it possible to introduce, a class of steam vessels known as "tramps."

In 1881 the price of transatlantic steamers was quoted at £22 per gross ton for one of 2,000 gross tons, with cabin accommodations and 13 knots speed. In 1891 the price had fallen to about £15 per gross ton. In 1884 the following prices were quoted:

1st class transatlantic steamers	£28 5s.	Over 4,000 gross tons.
2d " " "	£22 17s.	
Cargo	£20 10s.	

In 1891 the price of first-class transatlantic steamers was £21 to £23. At the present time a well-built British steamer of 1,620 gross tons for cargo-carrying will cost £14 10s., and "tramp" steamers, such as are now competing with American-built steamers on the Brazilian steamship line, can be had for £10 per gross ton. The American steamer "Alliance," of 2,500 gross tons, which cost $382,378, has to compete with British "tramps" that cost only $125,000, and it is no wonder that such competition is ruinous to the American steamship-owner. In this instance, however, it is admitted by the president of the company that a mistake has been made in putting on new, large, expensive, and handsome passenger and mail steamships. There are no builders of "tramps" in this country, nor is there any demand for such ships; the nearest approach to them being the Lake steamers, of which several have of late made sad and disastrous records.

While it must be admitted that the extra cost of 20 to 40 per cent. on a steamer, according to her quality, is a serious drawback to shipbuilding, the disadvantage does not terminate with the completion of the ship. The ship-owner in America starts in with 20 to 40 per cent. extra cost and the Federal and State laws immediately cripple his opportunity for successful competition with the cheap ship-owner. Thus an American ship is taxed in its home port the same as any other property, while in England, for example, only the net profits on the vessel are taxed. Various other vexatious and expensive laws curtail the profits of American ship-owners, but it is in the running expenses that he is at the greatest disadvantage, and for this there is no remedy or salvation except through subsidy or protection.

It costs practically as much to build in France and Italy as it does in England, and the margin is not very great between the United States and Great Britain. The enormous difference existing between the wages of the several countries would naturally lead a person to different conclusions, but the proofs to the contrary are indisputable and not to be controverted. England is to Europe what the United States is to the whole world. To England every poor devil of a workman, underfed and underpaid at home, flocks and shares the work of those already on the ground. His condition is materially improved, but when, in the course of time, he has saved a few pounds wherewith to travel still farther west, he arrives in these United States and here he sees and learns what he never dreamed of—how immeasurably superior his condition may become to what it was. It is because the American workman must live differently to the European workman that he requires and receives better pay, but the return is made in intelligent and conscientious work, and the proof of it is shown in the cost of our navy ships.

Thus, while an American-built ship does cost more than a similar foreign vessel, it is equally true, too, that the sailing of ships under the American flag entails increased expenditures. Take, for example, the actual running expenses of the following representative sailing vessels of 850 tons register :

	American.	British.	French.	German.
Wages	$574.00	$350.25	$315.00	$325.75
Victualing	300.00	250.00	225.00	180.00
Total cost one month	$874.00	$600.25	$540.00	$505.75

To compete successfully against such odds is out of the question. American ship-builders are not permitted, nor would they be allowed, to put afloat such craft as are doing business under foreign flags, and our ship-owner cannot run an expensive ship with a well-paid and well-fed crew, against a cheap foreign ship with a cheap and badly-fed complement. In support of this latter remark reference is made to the testimony before the Labor Commission in London, on January 27, 1892, when Samuel Plimsoll stated that a report to the Board of Trade showed that the food of sailors was worse than workhouse or prison fare ; that condemned naval stores were purchased for ships' use, the price running from 2 cents to 3½ cents per pound for meat, and that "such food was killing the men by the scores and hundreds." Mr. Plimsoll's charges were directed against ocean-going craft such as we know here as "tramps."

President Ivins, of the United States and Brazilian Steamship Company, testified April 28, 1892, before the Senate Committee on Commerce, that the comparative running expenditures on two steamers, the "Seguranca," an American-built steamer, and the "Glengoyl," a British tramp, were per month :

Seguranca,	wages $2,392;	provisioning, $1,036.50	$3,428.50
Glengoyl,	" 950;	" 306.00	1,256.00
Difference in favor of the tramp			$2,172.50

Both ships carry the same amount of cargo.

Mr. Ivins further said : "Now the Government can do either of two things for us. It can say, from humanitarian reasons and reasons of large national policy : 'We want to protect all of our industries alike. We will protect you.' We are the only thing that I can see that is pretty nearly unprotected. Or else it can say: 'Buy your ships where you want and we will give them an American register.'"

It is clear that even if a ship-owner could purchase a steamer abroad at a cost much less than it would cost here, the running expenses would ultimately embarrass him. Therefore, in order to make shipping profitable, the national and State governments should encourage rather than discourage ship-owning. It would not have paid to start many branches of industry in this country had not the Government aided them by protection, and that is just what our shipping needs—liberal subsidies to make the American dollar go as far on the ocean highway as the English crown and the Prussian thaler.

Philip Hichborn.